

# NCUR Application

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Attach File: <http://>

**Title of Presentation:**

Analysis of Radon Tests on a Sample Storage System for Ultra-Low Background Counting Stations at the Sanford Underground Research Facility

**BHSU IRB, IACUC or Biosafety #:**

**Abstract:**

The Earth's surface is bombarded by cosmic rays constantly. These particles cause background noise in experiments searching for the direct detection of dark matter and studying neutrino processes. The Sanford Underground Research Facility, which houses multiple physics experiments in these rare-event searches at its 4850' level, also contains the Black Hills Underground Campus (BHUC). The counting room in the BHUC was constructed for the purpose of analyzing samples using ultra-low background gamma-ray spectroscopy with germanium detectors. This work will describe the construction and assembly of the germanium detectors in the BHUC and a liquid nitrogen boil-off sample purge system. The germanium detectors, which consist of a single germanium crystal surrounded by a shield of lead bricks and copper plates, were developed to provide a better understanding of ultra-low radioactive background in samples for rare-event searches. Radon is a naturally occurring gas with radioactive properties and there are high levels of this colorless, odorless gas underground. Therefore, the sample purge system has been established to offer a way to reduce radon plate-out before and after analysis of the samples.

**I certify that: My project is at or near completion and the abstract accurately represents my findings:**

Yes

**Statement of Student Responsibilities:**

If my project is accepted for NCUR and I receive funding, I agree to:

- complete my project before departure
- make a trial presentation to my faculty advisor before departure
- present my paper/project at NCUR and attend other sessions
- all required IRB, IACUC and Biosafety approvals have been received
- give presentation at Black Hills Research Symposium (BHRS)
- Represent BHSU in a professional & responsible manner